Arthritis Quality Indicators for the Veterans Administration: Implications for Electronic Data Collection, Storage Format, Quality Assessment, and Clinical Decision Support

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ABSTRACT

The Veterans Administration (VA) uses information technology and performance measures to improve quality and efficiency. The VA stores all patient data electronically. Manual quality assessment audits are performed every three months. They are time consuming and expensive. Automated reviews would be more efficient. But the patient records are neither sufficiently coded nor structured to allow for full machine interpretability.

Evidence-based rheumatology quality indicators have been proposed for inclusion in the quality data set. Automated reviews for some conditions would be possible with modification to some VA electronic data entry screens and to the underlying data repository. This effort would risk the imposition of untenable data entry and workflow burdens upon clinicians. This paper outlines some specific considerations for one disease, rheumatoid arthritis.

Key Words: CPRS, EMR, Quality Indicators, VA

INTRODUCTION

In its ongoing effort to measure and improve the quality of its care, the Veterans Administration (VA) has adopted evidence-based process quality indicators including the Health Employer Data and Information Set[1] and the Diabetes Quality Improvement Project. Independent contractors audit VA performance on these measures every three months. In a time consuming and expensive process, human abstractors review samples of electronic patient records[2,3]. The results are used in the quality improvement process. The Institute of Medicine has observed that the VA's "integrated health information system, including its framework for using performance measures to improve quality, is considered one of the best in the nation"[4]. The VA is considering adoption of the Arthritis Foundation's quality indicator set[5].

The NCQA, CMS, and others, have suggested increased automation to decrease the disruption and expense of manual audits[6]. This paper considers some issues that might be encountered in an attempt to automate chart reviews using rheumatoid arthritis (RA) as an example.

BACKGROUND AND SIGNIFICANCE

The VA has over 1,347 hospitals, clinics and other facilities[3]. It participates in training more physicians (60% of American post-graduate trainees) than any other organization in the world. Since the 1970s, it has been developing medical computer information systems. It has deployed personal computer workstations in exam rooms and physician offices throughout the system to support the recording of patient data.

The VA stores all inpatient, outpatient and emergency department records electronically in a collection of servers it calls a health data repository (HDR). These include labs, vital signs, diagnostic tests, medicines, therapies, imaging studies, and more. The information is more available and searchable than paper records. The record of every veteran is available at all facilities via a VA intranet called Health*e*Vet[4].

Clinicians enter patient data into the HDR with a VA developed, GUI-based, electronic medical record called the Computerized Patient Record System (CPRS)[7]. Providers can create or alter data entry screens called templates in CPRS.

While templates are designed to enter new, they often also import previously stored data. Data lists and key phrases may be employed. This information is passed as formatted text into draft reports. Clinicians then edit those drafts prior to saving them to the HDR as discrete documents. This flexible scheme allows for the inclusion of a broad array of observations tailored to individual patients and providers.

Most reports have no required structure or terminology (coding) standards. Inconsistencies in data and disease definitions, and diagnostic criteria may be (and are) introduced, rendering unreliable the interoperability of some data over providers, sites, and time. Imprecise and relatively slow lexical searches of these essentially free text files are possible. But exact match queries of the sort needed for reliable quality assessment and clinical decision support are largely impractical. Humans must read these texts to fully extract their meaning[8]. Delay and expense are incurred.

In a document-oriented record, the patient is represented as an amorphous aggregate of (mostly) text files. This data model, which is more implied than defined, changes with the addition of each new type of file. In a structured patient model, data is stored as granular, i.e., discrete, (pre)defined attributes that are arranged for rapid computer interpretability and retrieval. The patient is characterized by the collection of attributes that the provider organization chooses to track. The VA HDR patient model is, as is the case in almost all systems, a mixture of the two.

Ideally, data of the patient model should map to standard terminologies (codes) like SNOMED® or LOINC® to assist knowledge representation and interoperability. Coded data facilitates interaction with electronic practice guidelines, medical libraries, decision support, and quality assessment software.

MATERIALS AND METHODS

The proposed RA quality indicator set for the VA is presented in Table 1. We analyzed it to identify the discrete data elements needed to assess fulfillment of each quality indicator and to determine which elements were explicitly defined in CPRS/HDR. And for those not defined, how might they be acquired. For this purpose, CPRS and its documentation were examined, expert users and VA IT professionals were consulted, and a focused literature review was performed.

RESULTS

Table 2 lists the required data elements mapped to their invoking quality indicator(s). Twenty elements were identified. Sixteen currently exist. Of them, 14 are captured with adequate granularity, while two would require modification—ID of diagnostician and informed consents. Four need to be created de novo—status of diagnosis, joint counts, functional status (HAQs), and coding of x-rays. Between quality indicators 3, 4, and 5, five categories of drugs are designated to treat RA—acetaminophen, DMARDs, glucocorticoids, narcotics, and NSAIDs. Those categories would require explicit definition in any assessment protocol. The medicines, methods of administration, and dosages would then be retrieved from the existing medicine list. We count all drugs as one element—the medicine list—that is captured discreetly. Comparison of serial dosages is invoked for all drugs.

Of the four missing elements, two are complex surveys—joint counts and patient questionnaire data (HAQ scores). Serial comparisons of them and of Acute Phase Reactants are indicated. Quantitative assessments of radiology images, as would be needed by a computer, are rarely performed in practice. There are three judgments, "worsening of symptoms", "treat with DMARD unless contraindicated" (indicator 3), and "evidence of active disease" (indicator 4), which rest upon ill-defined criteria.

Table 1 Proposed Quality Indicators for Rheumatoid Arthritis in the VA
Adapted from Catherine MacLean, MD, PhD

Topic	Quality Indicator	Source
Access	1. IF a patient has a new diagnosis of RA by a non-VA rheumatologist, THEN the time interval from PCP referral to appointment with a VA rheumatologist should be less than 3 months.	AFQuIP, BSR/RCP
History and exam	2. IF a patient has a diagnosis of RA confirmed by a VA rheumatologist, THEN a standardized measure of each of the following should be documented within 6 months of diagnosis and at 6 month intervals thereafter: joint counts, functional status (HAQ or MHAQ), acute phase reactant (ESR or CRP). Radiographic damage (hand and foot x-rays) should be assessed within 6 months of diagnosis and annually thereafter.	AFQuIP, BSR/RCP
Treatment	3. IF a patient has an established diagnosis of RA, THEN the patient should be treated with a DMARD unless contraindication or patient refusal is documented.	NCQA/HEDIS, AFQuIP, BSR/RCP
	4. IF a patient has RA and is being treated with a DMARD and reports worsening of symptoms over a 6-month period of time and there is evidence of active disease, THEN one of the following should be done: increase DMARD dose, change DMARD, add an additional DMARD or, start or increase dose of glucocorticoids.	AFQuIP
Informing patients about risks	5. IF a patient is newly prescribed any of the following drugs: acetaminophen, NSAIDs (selective or non-selective), DMARDs, glucocorticoids, or narcotics, THEN a discussion with the patient about the risks versus benefits of the chosen therapy should be documented in the patient's medical record.	AFQuIP

RA = Rheumatoid arthritis; PCP = Primary care provider; DMARD = disease modifying anti-rheumatic drug.
AFQuIP = Arthritis Foundation Quality Indicator Project; BSR/RCP = British Society of Rheumatology/ Royal College of Physicians;
NCQA/HEDIS = National Committee for Quality Assurance/ Health Employer Data and Information Set.

Table 2. Data needed to evaluate Quality Indicators for Rheumatoid Arthritis

	Element	Indicator(s) needed For	To be created in CPRS
1.	ICN	1	
2.	Patient Name	1	
3.	Gender	3 4 5	
4.	Date of Birth	1	
5.	Diagnosis of RA	1 2 3	
6.	Status of Diagnosis	1	*
7.	Date of Diagnosis	1	
8.	ID of Diagnostician	1	?
9.	Request Tracking	1	
10.	Appointment	1	
11.	Date Appointment	1	
12.	Problem List	1 2 3 4	
13.	Acute Phase Reactant	2 4	
14.	Joint Count	2 4	*
15.	Functional Status (HAQs)	2	*
16.	X-ray report dates	2	
17.	Quantification of x-ray	2 4	*
18.	Allergy List	3	
19.	Medicine List	3 4 5	
20.	Informed Consents	3 5	?

ICN = Integration control number

* = Needs to be created

? = Incomplete functionality

DISCUSSION

Patient data for decision support and automated quality assessment must be computer interpretable. Data sources in the HDR vary in granularity and hence interpretability. Their utility also hinges upon completeness, validity, timeliness, and format. Errors are endemic to databases. The HDR is no exception.

A mix of clinician specialists—nurses, nurse practitioners, physician assistants, pharmacists, and physicians—maintains the CPRS problem list. The problem list would be interrogated for quality indicators 1 thru 2 for the possible presence of RA and for indicator 3 for conditions that might contraindicate the use of certain drugs[7]. The list has no standards for disease definitions or diagnostic criteria, as there are, for instance, inclusion and exclusion criteria for clinical trials.

For indicator 4, how does one define "a worsening of symptoms"? Appropriate quantitative parameters (HAQ scores, acute phase reactant levels, drug doses, etc) can easily be compared over time: But at what intervals? With which algorithms? At what thresholds? Modified by which patient specific data? A 2006 study highlighted how such a lack of precision in explicit criteria could produce substantial variation in quality assessments for RA[9]. While human reviewers can often infer the true nature of things, employing them defeats the sought after efficiencies and may introduce inconsistencies.

Like the problem list, the VA allergies and medicine lists show only modest data accuracy[10]. Though we treat the medicine list as a single element, each drug must be entered individually. The medicine list would be consulted for quality indicators 3, 4 and 5. Medicines prescribed in the order entry module of CPRS are tracked automatically. But there is no automated capture of medicines prescribed outside the VA, obtained over the counter, or complimentary and alternative remedies. Providers can record these medicines in a structured template[7]—the non-VA medicines section of the orders module—but more often record them, if at all, as free text in encounter notes.

The allergies list, while not mentioned explicitly in the quality indicators, would be examined for contraindicated medicines checking for adverse drug-lab, drug-drug and drug-patient (problem-list and demographics like age or gender) interactions. Allergies are recorded in an Adverse Reaction Tracking module in CPRS.

Radiology reports in CPRS are labeled as to type (hip, chest, etc…) but not coded as to results. The presence or progression of any "disease activity" based upon x-rays (quality indicator 4) cannot be reliably computed without human intervention.

Self-report data, like the rheumatology Health Assessment Questionnaire (HAQ), are used to record functional status (indicator 4). They are usually not routinely collected in the VA or elsewhere. Computer assisted interview systems for the unaided self-entry of self-report data in a coded fashion have been shown to be valid, reliable and feasible. Such systems can provide high quality data while minimizing the collection burden for clinic personnel[11].

Joint counts, like the ACR 28, quantify disease activity. As with self-report data, validated diagrammatic computerized templates for the self-entry of joint counts by patients exist[12].

CPRS has an electronic consent module that can document discussions of the risks and the benefits of therapeutic choices (indicator 5). iMedConsents creates tailored forms based on patient

specific data that are composed, explained, signed and stored electronically at the point of care. It is unclear how declined treatments are documented in a coded fashion. These consents are not machine-interpretable.

Paper-based records may be scanned and may even be digitized through optical character recognition—if one has a clean copy that is neatly typed or printed. For these and even for records received in electronic formats, the data are rarely interoperable between systems.

It is possible to construct a set of templates to fully structure data entry for RA by modification of the existing rheumatology section of CPRS's Medicine Module as a complement to the existing Clinic Note Template (CNT). The set could include screens for diagramming joint counts, viewing and/or collecting serial questionnaire data and labs, and it could have embedded links to relevant informed consents. Unanticipated events will inevitably occur. Additional details (within and beyond RA) necessary for patient management would be collected with the existing CNT. It would be time consuming and tedious to the point of impracticality.

One difficulty of this proposal is the need for collecting more structured data and more data overall in the clinic than is currently done by already beleaguered clinicians (and bewildered patients). Workflows and clinician behavior would be altered. These are notoriously hard behaviors to change.

A second difficulty is that templates tend to be provider or disease focused, and not patient centric. Yet, any new data elements would need to integrate gracefully into a coherent HDR patient model for code and database maintenance and for future development. Lastly, it should be borne in mind that this is but one of numerous candidate conditions for quality assessment.

CONCLUSIONS

Clinicians may not mind doing the extra work of coded and structured data entry if subsequent recall and display allowed them to quickly grasp clinical trends and if the effort could be demonstrated to improve health assessments, decision support and outcomes. Additional time during encounters to allow for additional data entry would probably be needed.

In the short term, we think that fully structured data entry for RA in the VA to facilitate automated chart reviews is impractical. Computers demand clarity and precision that, in open systems such as healthcare, often prove too costly in time and money to supply. Yet, even with critical components missing, humans reliably discern patterns. While greater automation is desirable for quality assessment and even though for some elements it is already practical—computer assisted interview systems, for example—the machines will not soon replace the non-perfectible humans.

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